N° 15,176 A.D. 1912

Date of Application, 28th June, 1912—Accepted, 24th Apr., 1913

COMPLETE SPECIFICATION.

Fluid Pressure Engine.

I, JOHN KELLINGTON, Machinist, of Lyon Cannery, New Westminster, British Columbia, Canada, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a gas engine of that class wherein the energy of the explosion is imparted through the pistons against the inclined inner surface of a ring, which is rotatably mounted without the cylinders, which cylinders are secured to the foundation frame of the engine, while the rotatable ring is secured to the driving shaft, and my object has been to attain in a simple and effective manner a comparatively low speed of rotation of the shaft in relation to the piston speed.

Multiple piston engines are known wherein the cylinders are disposed in radial arrangement with respect to a common inner chamber, and wherein the outer end of the piston rod is in connection with a gear, all of the gears transferring their movement to a common gear, which is thereby rotated. It is also known to impart a rotary movement by guiding the outer end of these piston rods in cam tracks disposed on a rotary element. The present invention differs from these known devices by the peculiar arrangement of the track and by a connection of the guiding rollers with the piston rods. In the present invention these rods are connected with levers, the outer ends of which carry the guiding rollers. The levers are supported by brackets projecting from the cylinders.

There are other incidental features of improvement in the engine to which attention is drawn in the following specification, which fully describes the invention, reference being made to the drawings by which it is accompanied, in which:—

Figure 1 is a vertical section of the engine in the common plane of its cylinders or normal to the axis of rotation.

Figure 2 is a vertical section through the axis of rotation.

Figure 3 is a front elevation of the engine to a small scale.

Figure 4 is a plan.

Figure 5 is a plan of one of the radius levers which direct the movement of the contact levers of the piston.

In these drawings 2 2 2 2 represent the cylinders of the engine which are cast in one and radiate from a common centre in a common plane.

Integral with these cylinders 2 is a cylinder jacket 3, which includes within it the inner ends of the cylinders which are exposed to the heat of the explosion. The front jacket cover 4 is integral with the valve box 6 to be described later and with a member 7 by which the cylinders and their attached parts are secured to the foundation frame 8 of the engine. The cover 5, which closes the back of the water jacket, has a bearing 9 to receive the end of the driving shaft 10 which is also supported in a bearing 17 of the foundation frame 8.

The valve box 6 is preferably cast with the front jacket cover 4 and is in

[*Price 8d.*]

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connection through an aperture 11 with the junction of the opposed cylinders 2. To the upper side of it the explosive gas is delivered through a suction valve 13 by a pipe 12 from the carbureter, which valve is normally retained on its seat by a light spring 14. In the face of the valve box 6 the ignition plug 17 is inserted and in the lower part of the valve box 6 is a discharge valve 15, the stem 16 of which is mechanically operated from a rotatory part of the engine in a manner to be described later.

Each cylinder 2 is provided with a piston 20 which is hollow and closed at its inner end, the corners of which inner end are removed, as shown in Figure 1 of the drawing, to enable the four pistons to approach close to one another at the inner limit of their stroke.

A connecting link 21 is mounted on a pin 22 secured in each cylinder and at the outer end of the link 21 rollers 23 are mounted on a pin 24.

The outer roller carrying end of each connecting link 21 is controlled in its movement by a radius lever 25 having a fork end to take the pin 24 of the rollers 23, which lever is mounted on a fulcrum pin 26 in a bracket 27 formed as a part of the cylinder casting.

The radius lever 25 is produced beyond its fulcrum pin 26 and is offset laterally to carry a roller 28 on a pin 29, the object of which will be explained later.

Secured on the driving shaft 10 is a wheel 30, the ring 31 of which is projected over the outer ends of the cylinders and the inner side of it is a track for the rollers 23 and is formed, as shown in Figure 1, to offer a series of inclines 32 33, the number of each of which corresponds to the number of cylinders and the radial rise and fall to the stroke of their pistons. Thus, when the pistons are forced out by an explosion delivered at the junctions of the cylinders, this outward effort will be exerted against the curved inclines 32 of the rim 31 of the wheel 30 and will exert a rotatory effort on the wheel and on the driving shaft 10 to which it is secured, and this rotatory effort is increased by the control exercised on the contact rollers 23 by the radius levers 25, the position of the fulcra 26 of which are such that the arc of movement of the roller pins 24 is toward the direction of rotation.

The inclines 32 may be straight but will preferably be curved, as shown in the drawing, while the return inclines 33, that is those inclines which return the piston inward in the cylinders will preferably be approximately straight.

To carry the pistons 20 outward during the suction stroke the roller 28 is furnished at the further end of the radius lever 25 and the roller bears upon a corresponding curved track 35, which is laterally alongside of the track 32, 33 and may form a part of the same wheel rim 31, and to enable the rollers 23, 28 to be adjusted that they may bear equally on their respective tracks; the pin 29 of the rollers 28 is eccentric with a throw that will range through the possible variation.

The contact for ignition of the charge, and the opening of the exhaust valve 16 are effected from a ring 36 which may be integral with or secured to the wheel ring 31, and is formed with a track having cams 45 for the exhaust valve and projections 37 for operating the ignition device.

As each cylinder of the engine acts on what is known as the four cycle system, drawing in its charge in one outward stroke, compressing it during the next inward stroke, exploding the charge during the next outward stroke and exhausting during the next inward stroke, and as there are two pairs of opposed pistons and therefore four inclines 32 in the circle of the wheel against which they act, the charge, which is common to all four cylinders, requires to be ignited twice and exhausted twice in the revolution of the wheel 31.

Contact for ignition is effected by the projections 37 secured to the ring 36 engaging a resilient contact 38 which is adjustably mounted on suitable insulation 40 on an arc segment standard 39 secured to the frame 8. The position of the contact on the segment 39 is adjusted by a spring 41 engaging notches on the inner or concave side of the segment, By this means the ignition may

be timed according to the position of the piston contact rollers 23 in relation to the crown or apex of the several inclines 33.

On the inner side of the same ring 36 are the enlargements 45, by which the exhaust valve 15 is lifted to release the products of combustion from the united cylinders and emit them to the exhaust pipe 18. The length of the enlargement 45 is such as will retain the valve 15 open during the exhaust stroke of the engine.

The stem 16 of the exhaust valve 15 rests upon the outward projection 46 of a member 47 which is vertically slidable in a guide on the lower part of the foundation frame 8 immediately below the exhaust valve and this member 47 is provided with a roller 48 which contacts with the inner side of the ring 36 and will therefore be lifted by the inward projection 45 of the ring 36.

Water is circulated within the cylinder water jacket 3 by the pipes 50 which deliver into the water jacket 3 through chambered recesses on each side of the valve box 6 by which that box is kept cool.

While working the explosive mixture is drawn in from the carbureter through the valve 13 while the pistons 20 are being drawn out by contact of the rollers 28 with the supplementary track 35 and while the piston contact rollers 23 are travelling down the incline 32. As these contact rollers 23 reach the further limit of their outward movement they encounter the inclines 33 and the pistons are by the momentum of the wheel rim 31, returned within their cylinders, mutually compressing the charge at the junction. When further rotation of the rim 31 under its inertia brings the apices of the inclines 32, 33 past the rollers 23 the contact points 37 of the rings 36 engage the contact plates 38 and cause ignition and explosion of the charge.

The pistons 20 are then all forced outward, and each one acting through its roller 23 on the angled face of the adjacent incline 32, a rotational impulse is imparted to the wheel 30, 31 and through it to the driving shaft 10.

When the pistons reach the further limit of this stroke, the exhaust valve 15 is lifted by engagement of the roller 48 with the enlargement 45 on the inner side of the ring 36, and by the length of that enlargement is maintained open until the return stroke of the piston is effected by contact of the rollers 28 with their inclines 33.

The rotational impulse is thus imparted by all four pistons through one-eighth of the circle of rotation twice during each revolution and this impulse is delivered through a roller contact on the curved face of the incline.

The advantages claimed for this construction are: The attainment of a moderate speed of rotation with an effective high piston speed; the delivery of the impulse of the explosion in an effective manner to produce rotation, in distinction of what occurs in a crank engine where the explosion occurs while the crank is in an ineffective position at or close to its dead centre, and the fact that one gas admission, one ignition and one exhaust serves for all four cylinders.

Although specifically described as a gas engine, the mechanism, with the exception of the ignition, is applicable to a fluid pressure engine of any kind.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a fluid pressure engine, a stationary member having a plurality of cylinders, open at their outer ends and merging into each other at their inner ends, a piston in each cylinder, these pistons being adapted, when in their retracted positions, to come into closely spaced relation with each other, thus forming a closed compression space without the use of stationary cylinder heads, connecting means between each piston and one end of a corresponding double arm lever which pivots on a stationary fulcrum, and a rotatable casing surrounding the cylinders, this casing being provided with two series of inclined surfaces, which are adapted to engage rollers at the respective ends of the double armed levers.

2. In a fluid pressure engine, as set forth in Claim 1, providing the rotatable member having the inclined surfaces with a cam track adapted to actuate an exhaust valve at predetermined intervals.

3. In a fluid pressure engine, as set forth in Claim 1, the provision of means co-acting with portions of the rotary casing to control the igniting circuit at predetermined adjustable intervals.

4. The new or improved form of fluid pressure engine substantially as herein described with reference to the accompanying drawings.

Dated this 25th day of June, 1912.

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KELLINGTON'S Complete Specification.

(2 SHEETS)

SHEET 1.

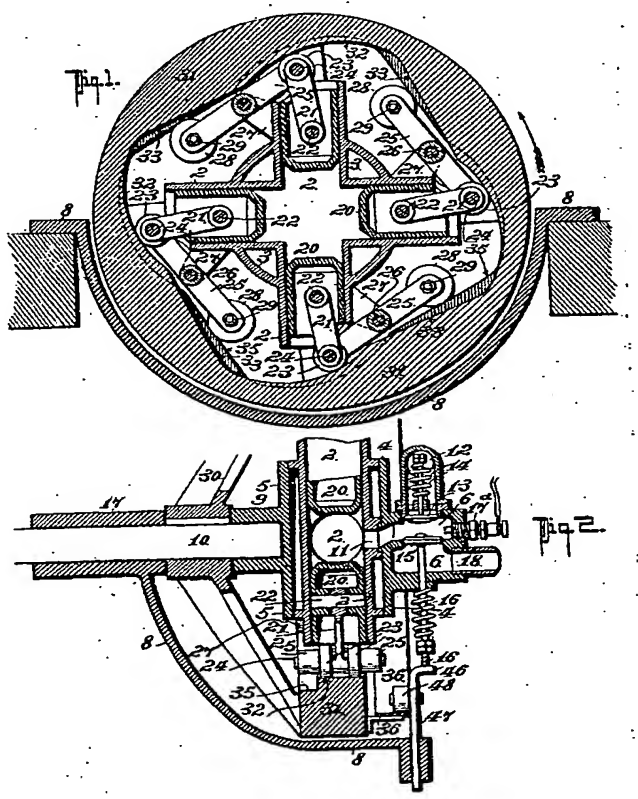


Fig. 1.

Fig. 2.

SHEET 2.

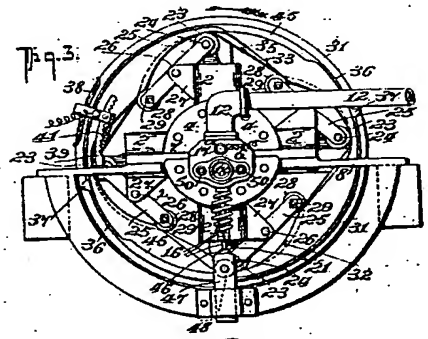
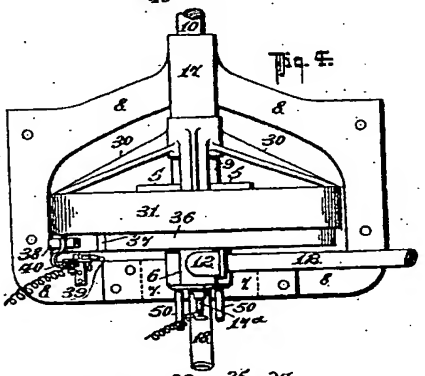


Fig. 3.



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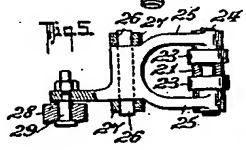

Fig. 5.

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KELLINGTON'S COMPLETE SPECIFICATION.

SHEET 1.

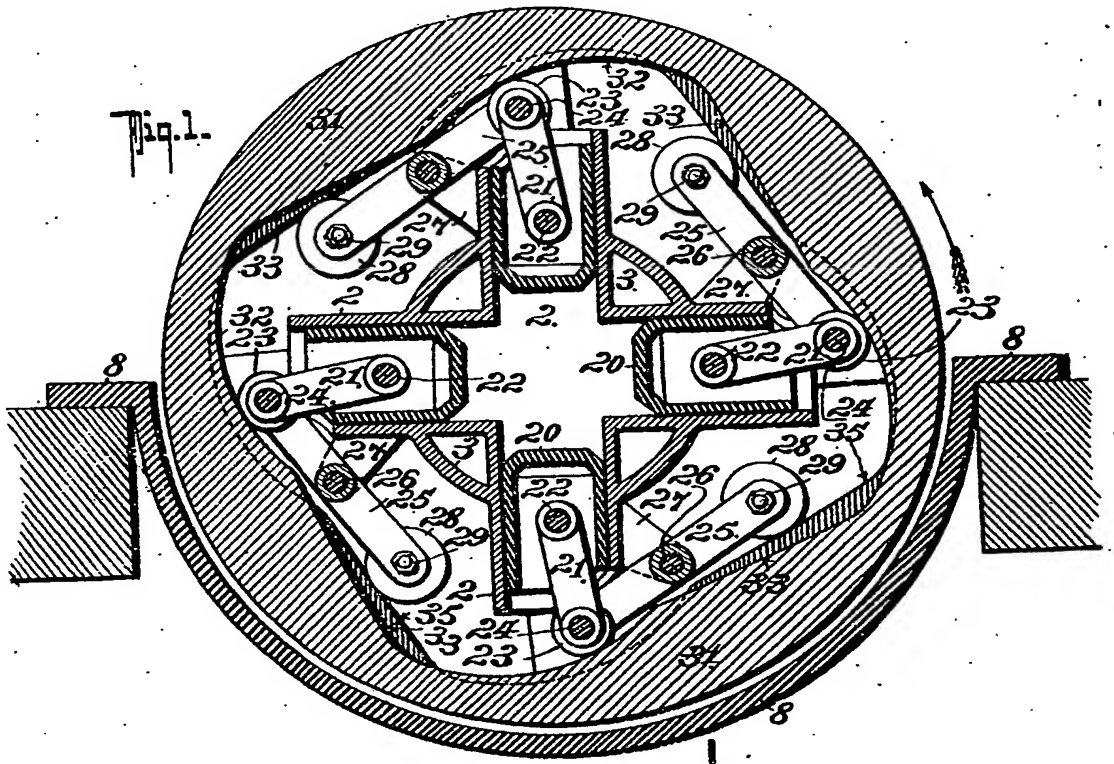

Fig. 1.

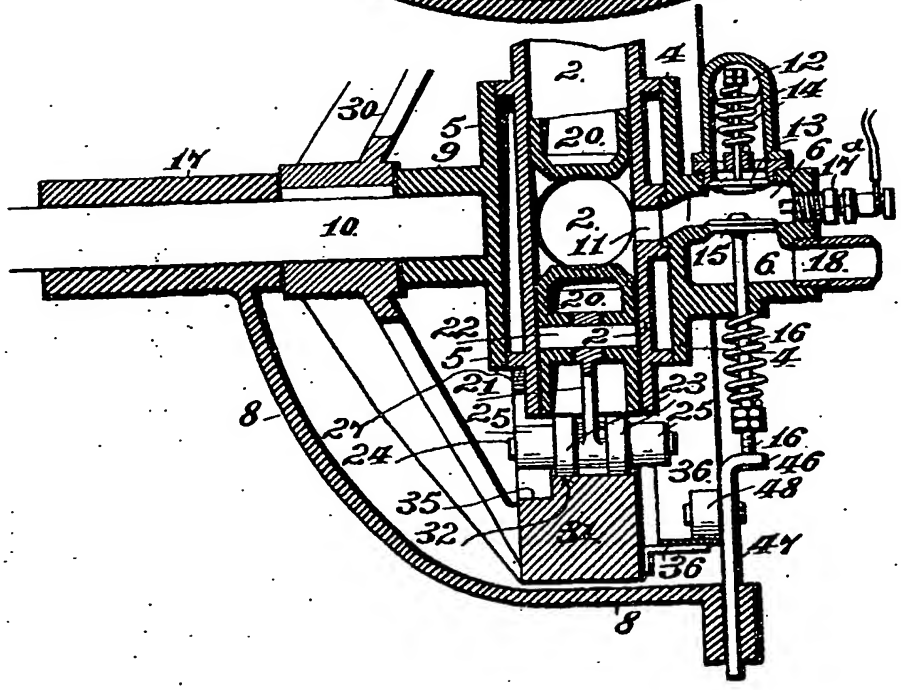

Fig. 2.

[This Drawing is a reproduction of the Original on a reduced scale.]

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SHEET 2.

Fig. 3.

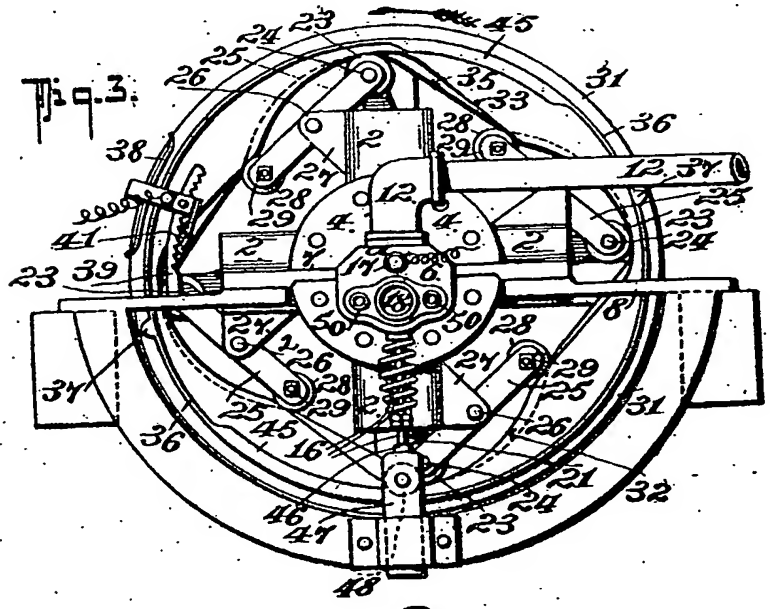


Fig. 4.

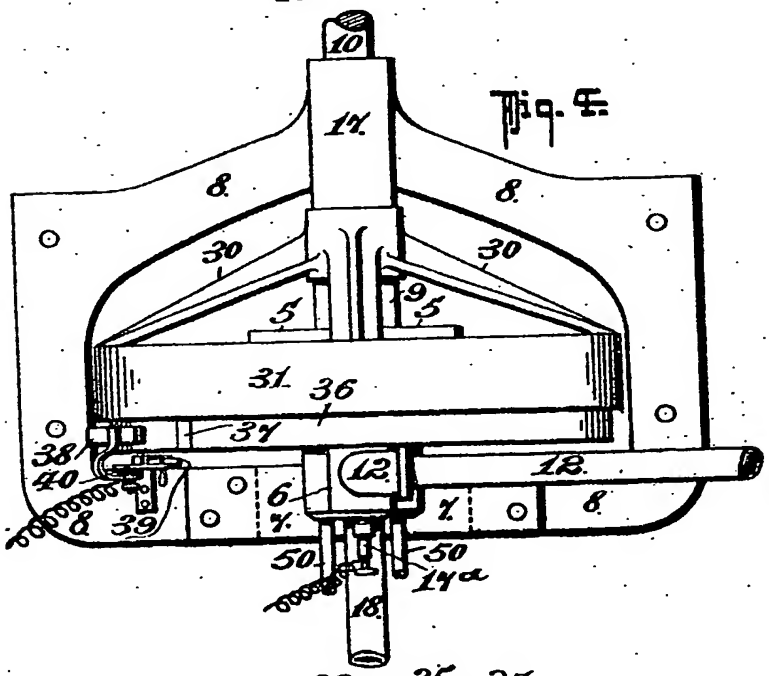
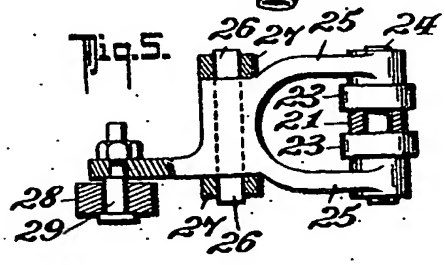


Fig. 5.



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